

I(we) claim:

1. An apparatus for detecting a concentration and a remaining amount of a liquid reducing agent comprising:

a sensing unit disposed in a storage tank that stores a liquid reducing agent for outputting a signal in relation to a concentration and a remaining amount of the liquid reducing agent based on a heat transfer characteristics between two points distant apart from each other; and

a control unit that includes therein a built-in computer,

wherein the control unit performs:

outputting a measurement trigger at every moment of a predetermined time interval after starting of an engine;

determining that a vehicle state is stable when a stop time for which a vehicle is continuously in a stationary state reaches a predetermined determination time;

calculating the concentration of the liquid reducing agent based on the signal from the sensing unit when the measurement trigger is output and it is determined that the vehicle state is stable; and

determining the remaining amount of the liquid reducing agent when the measurement trigger is output, based on the signal from the sensing unit.

2. The apparatus for detecting the concentration and the

remaining amount of the liquid reducing agent according to claim 1, wherein the control unit calculates a deceleration of the vehicle and sets the determination time on the basis of the deceleration which was calculated.

3. The apparatus for detecting the concentration and the remaining amount of the liquid reducing agent according to claim 1, wherein the control unit successively sums up given points corresponding to results of determination of the remaining amount of the liquid reducing agent that was made based on the signal from the sensing unit; and determines that the liquid reducing agent has been used up when the sum of the points becomes equal to or greater than a predetermined value.

4. The apparatus for detecting the concentration and the remaining amount of the liquid reducing agent according to claim 3, wherein the control unit writes the points in a nonvolatile memory when the engine stops while reading the points out of the memory when the engine is started.

5. The apparatus for detecting the concentration and the remaining amount of a liquid reducing agent according to claim 1, further comprising a concentration data-storing unit that stores data of the concentration of the liquid reducing agent,

wherein the control unit is configured to renew the data of the concentration of the liquid reducing agent stored in the concentration data-storing unit by the calculated concentration of the liquid reducing agent.

6. The apparatus for detecting the concentration and the remaining amount of the liquid reducing agent according to claim 5, further comprising a concentration indicating unit that visually indicates the concentration of the liquid reducing agent stored in the concentration data-storing unit.

7. The apparatus for detecting the concentration and the remaining amount of the liquid reducing agent according to claim 5, further comprising a first annunciating unit that provides a notice that the concentration of the liquid reducing agent stored in the concentration data-storing unit deviates from a predetermined range when such a deviation occurs.

8. The apparatus for detecting the concentration and the remaining amount of the liquid reducing agent according to claim 1, further comprising a remaining amount data-storing unit that stores data of the remaining amount of the liquid reducing agent,

wherein the control unit renews the data of the remaining amount of the liquid reducing agent stored in the remaining amount

data-storing unit according to a determination result of the remaining amount of the liquid reducing agent.

9. The apparatus for detecting the concentration and the remaining amount of the liquid reducing agent according to claim 8, further comprising a second annunciating unit that provides a notice that the remaining amount of the liquid reducing agent stored in the remaining amount data-storing unit becomes substantially void when such void amount of the liquid reducing agent occurs.